

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 5270

MSAS NO. 130

OVER THE

RED RIVER OF THE NORTH

DISTRICT 4 - CLAY COUNTY, CITY OF MOORHEAD



PREPARED FOR THE
MINNESOTA DEPARTMENT OF TRANSPORTATION
BY
COLLINS ENGINEERS, INC.
JOB NO. 5221 (CEI 46)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 5270 consisted of Pier 6 and 7. The concrete of the piers was in good condition with light to moderate scaling. No defects of structural significance were observed. The channel bottom exhibited a local scour depression at the upstream nose of Pier 7 exposing the footing at that location. There were moderate to heavy timber drift accumulations at both piers.

INSPECTION FINDINGS:

- (A) Light to moderate scaling with 1/8 inch typical penetrations and 1/2 inch maximum penetrations was observed on Piers 6 and 7 from 4 feet above the waterline to the channel bottom.
- (B) A moderate accumulation of timber debris with drift pieces up to 6 inches in diameter was observed along the downstream half of the east face of Pier 6, the debris extended from the channel bottom up 3 feet and off the pier faces by up to 6 feet.
- (C) A heavy accumulation of timber debris, consisting of logs and branches up to 2 feet in diameter, was observed around the entire perimeter of Pier 7. The debris extended from the channel bottom to 1 foot above the waterline.
- (D) An area of section loss, 2 feet wide by 18 inches high with 2 inches of penetration was located at the waterline at the downstream nose of Pier 6 with exposed reinforcing steel exhibiting less than 10 percent section loss.
- (E) A 1 foot high by 6 inch wide spall with exposed and corroded reinforcing steel was observed at 10 feet above the waterline on the northeast corner of the downstream column of Pier 7.

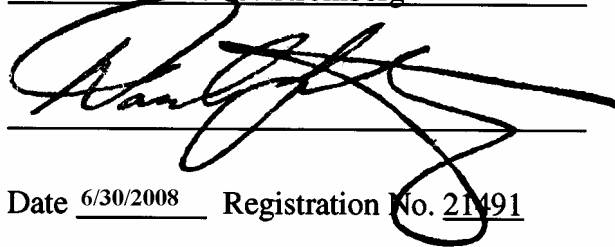
- (F) The footing of Pier 7 was exposed along the entire west face of the upstream column with up to 2 feet of vertical face exposure.

RECOMMENDATIONS:

- (A) Monitor the channel bottom elevations especially around the exposed Pier 7 footing after major flood events and during the biennial inspections.
- (B) Remove the accumulations of timber debris at Piers 6 and 7 during future maintenance operations.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years. If soundings during or after a high water event suggest the presence of scour and increased footing exposure, and underwater inspection may be warranted at that time.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

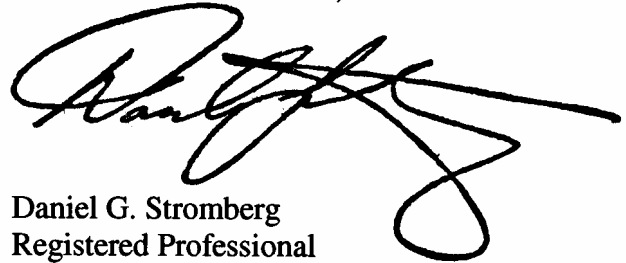
Daniel G. Stromberg



Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 5270

Feature Crossed: Red River of the North

Feature Carried: MSAS No. 130

Location: District 4 - Clay County, City of Moorhead

Bridge Description: The superstructure consists of thirteen multiple steel girder spans. The superstructure is supported by two reinforced concrete abutments, nine steel H-pile piers, and three reinforced concrete piers. The footings of all concrete substructure units are supported by timber piles. The substructure units are numbered starting from the west end of the bridge. Piers 6, 7 and 8 carry the spans across the river.

2. INSPECTION DATA

Professional Engineer/Team Leader: Bradley A. Syler, P.E., S.E.

Dive Team: John J. Loftus, Valerie Rouston

Date: August 20, 2007

Weather Conditions: Cloudy, 60°F

Underwater Visibility: Negligible/None

Waterway Velocity: 0.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 6 and 7.

General Shape: The pier shafts consist of three multi-sided reinforced concrete columns connected by two narrow reinforced concrete diaphragm walls. The upstream and downstream columns each sit on rectangular pile supported footings.

Maximum Water Depth at Substructure Inspected: Approximately 9.2 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the upstream end of Pier 7.

Water Surface: The waterline was approximately 23.0 feet below reference.

Waterline Elevation = 871.8.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 5

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code N/96

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

 Yes X No



Photograph 1. Overall View of the Structure, Looking South.



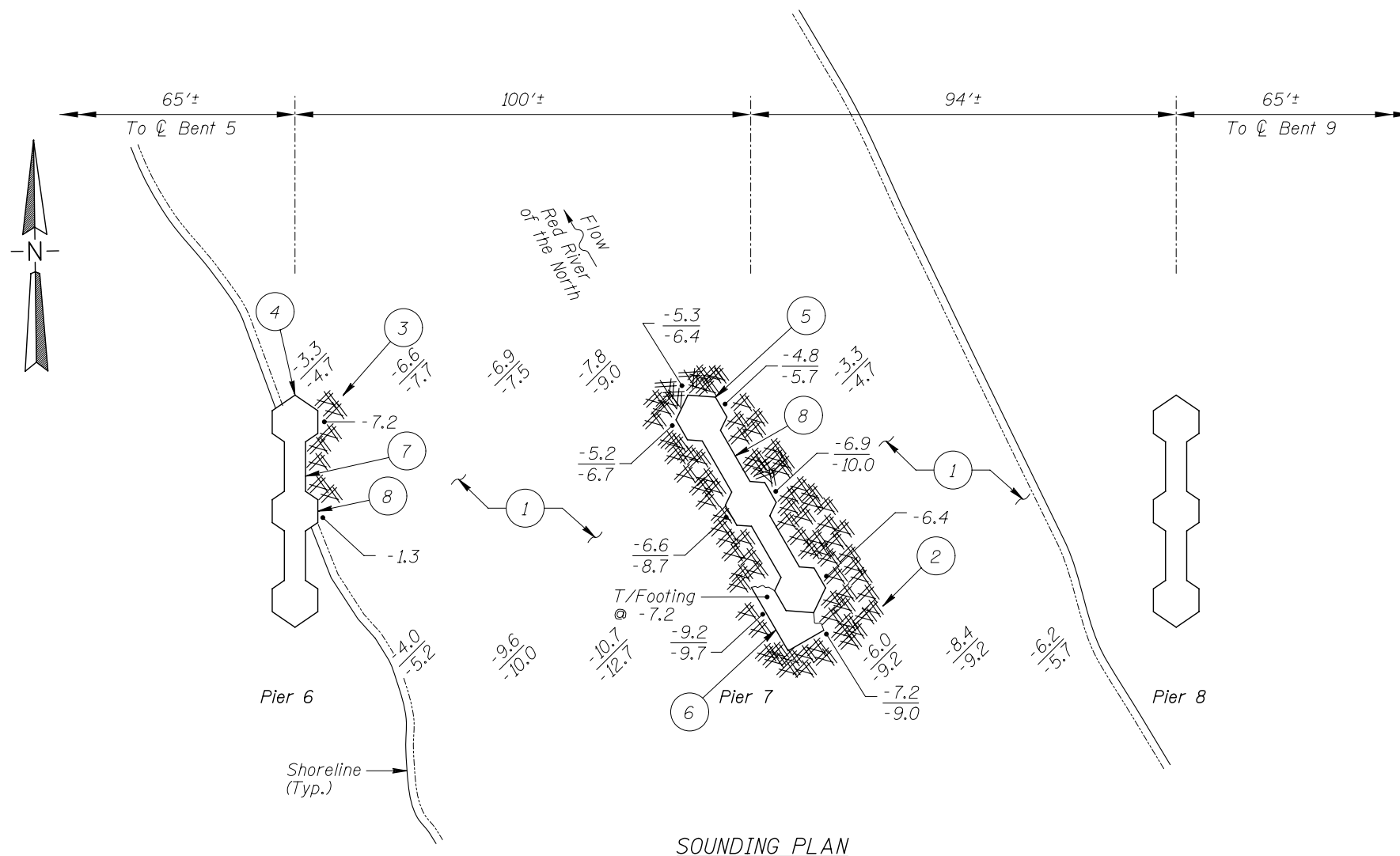
Photograph 2. View of Pier 6 and West shore, Looking West.



Photograph 3. View of Pier 7, Looking West.



Photograph 4. View of Pier 8 and East shore, Looking South.



GENERAL NOTES:

- Piers 6 and 7 were inspected underwater.
- At the time of inspection on August 20, 2007, the waterline was located approximately 23.0 feet below the top of the pier cap at the upstream end of Pier 7. This corresponds with a waterline elevation of 871.8.
- Soundings indicate the water depth at the time of inspection and are measured in feet.
- Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

- The channel bottom material around the entire perimeter of Piers 6 and 7 consisted of cobbles, rocks, and concrete rubble up to 2 feet in diameter.
- A heavy accumulation of timber debris, with pieces up to 2-feet-diameter, was observed around the entire perimeter of Pier 7. The debris extended from the channel bottom to 1 foot above the waterline and up to 20 feet off the east face, 10 feet off the west face and downstream nose, and 15 feet off the upstream nose.
- A moderate accumulation of timber debris, with pieces up to 6-inch-diameter, was observed along the downstream half of the east face of Pier 6. The debris extended from the channel bottom up 3 feet and off the face up to 6 feet.
- An area of section loss 2 feet wide by 18 inches high with 2 inches of penetration was located at the waterline at the downstream nose of Pier 6 with exposed reinforcing steel exhibiting less than 10 percent section loss.
- A 1 foot high by 6 inch wide spall with exposed and corroded reinforcing steel was observed at 10 feet above the waterline on the Northeast corner of Pier 7 downstream column.
- Exposed footing, located 7.2 feet below the waterline, with up to 2 feet of vertical face exposure was observed along the entire west face of the upstream column of Pier 7.
- A vertical crack up to 1/4 inch wide was observed in the Pier 6 webwall at 6 feet north of the center column extending from 1 foot below the waterline to top of cap.
- Light to moderate scaling with 1/8 inch typical penetrations and 1/2 inch maximum penetrations was observed from 4 feet above the waterline to the channel bottom on Piers 6 and 7.

Legend

-2.0 Sounding Depth (8/20/07)
-5.2 Sounding Depth (10/28/02)

Timber Debris

Note:

All soundings based on 2007 waterline location.

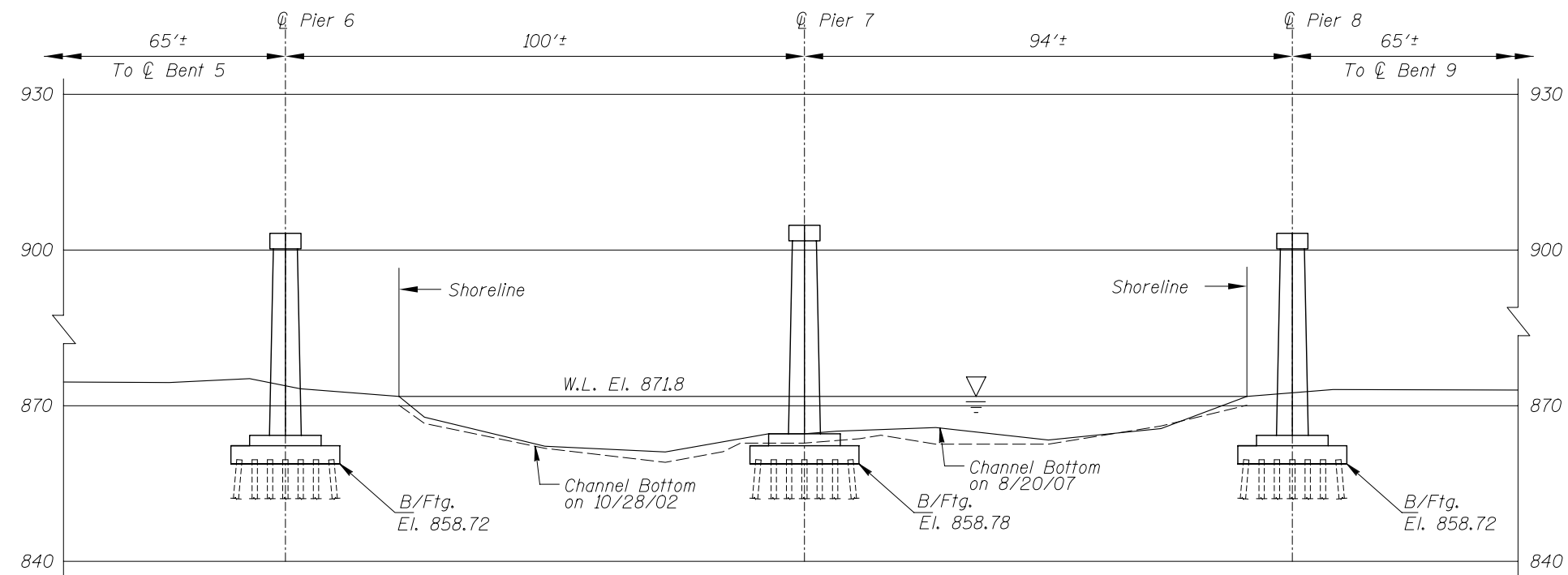
MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 5270
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DISTRICT 4, CLAY COUNTY, CITY OF MOORHEAD

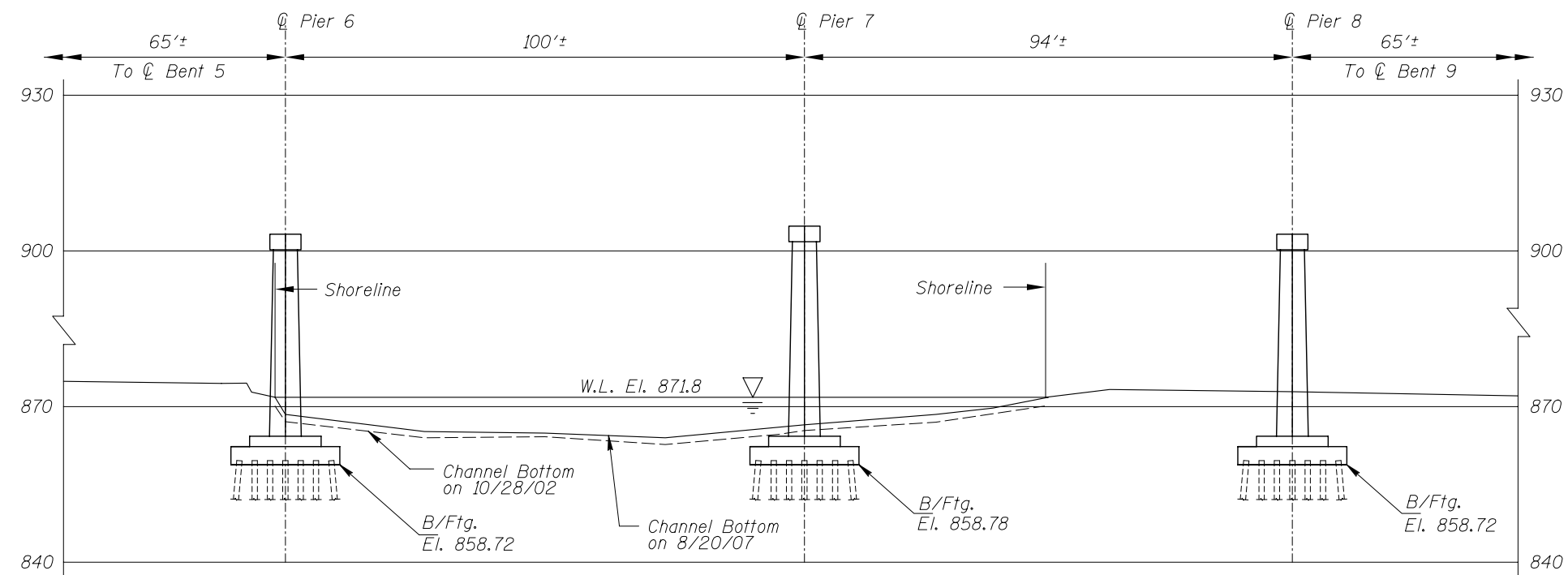
INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS	123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: AUGUST, 2007
Checked By: MDK			Scale: NTS
Code: 52210046			Figure No.: 1

TYPICAL END VIEW OF PIERS



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 5270 OVER THE RED RIVER OF THE NORTH DISTRICT 4, CLAY COUNTY, CITY OF MOORHEAD UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: PRH Checked By: PRH Code: 52210046	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007 Scale: 1"=30' Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 20, 2007
ON-SITE TEAM LEADER: Bradley A. Syler, P.E., S.E.
BRIDGE NO: 5270 WEATHER: Cloudy, 60°F
WATERWAY CROSSED: Red River of the North
DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
 OTHER
PERSONNEL: John J. Loftus, Valerie Roustan
EQUIPMENT: Scuba, U/W Light, Scraper, Sounding Pole, Lead Line, Probe Rod, Camera
TIME IN WATER: 2:30 p.m.
TIME OUT OF WATER: 3:15 p.m.
WATERWAY DATA: VELOCITY 0.5 f.p.s.
VISIBILITY Negligible/None
DEPTH 9.2 feet maximum at Pier 7
ELEMENTS INSPECTED: Piers 6 and 7
REMARKS: The concrete of the piers was generally in good condition with no defects of structural significance, except for an area of section loss located at the waterline at the downstream nose of Pier 6 with exposed reinforcing steel. Also, a spall with exposed reinforcing was observed 10 feet above the waterline on the northeast corner of the downstream column of Pier 7. Up to 2 vertical feet of footing exposure was observed along the entire west face of the upstream column of Pier 7. Light to moderate scaling with 1/8 inch typical penetrations was observed from 4 feet above the waterline to the channel bottom on both piers. A heavy accumulation of timber debris with pieces up to 2 feet in diameter was observed around the entire perimeter of Pier 7 and a moderate accumulation of drift was observed along the downstream half of the east face of Pier 6.

FURTHER ACTION NEEDED: X YES NO

Monitor the channel bottom elevations especially around the exposed Pier 7 footing after major flood events and during the biennial inspections.

Remove the accumulations of timber debris at Piers 6 and 7 during future maintenance operations.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years. If soundings during or after a high water event suggest the presence of scour and increased footing exposure, and underwater inspection may be warranted at that time.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 5270
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Bradley A. Syler, P.E., S.E.
WATERWAY CROSSED Red River of the North

INSPECTION DATE August 20, 2007
NOTE: USE ALL APPLICABLE CONDITION
DEFINITIONS AS DEFINED IN THE MINNESOTA
RECORDING AND CODING GUIDE INCLUDING
GENERAL, SUBSTRUCTURE, CHANNEL AND
PROTECTION, AND CULVERTS AND WALL
DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 6	7.2'	N	7	N	9	N	7	6	6	7	6	6	7	N	N	N	N	N
	Pier 7	9.2'	N	7	7	9	N	7	5	6	6	5	5	7	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: The concrete of the piers was generally in good condition with no defects of structural significance, except for an area of section loss located at the waterline at the downstream nose of Pier 6 with exposed reinforcing steel. Also, a spall with exposed reinforcing was observed 10 feet above the waterline on the northeast corner of the downstream column of Pier 7. Up to 2 vertical feet of footing exposure was observed along the entire west face of the upstream column of Pier 7. Light to moderate scaling with 1/8 inch typical penetrations was observed from 4 feet above the waterline to the channel bottom on both piers. A heavy accumulation of timber debris with pieces up to 2 feet in diameter was observed around the entire perimeter of Pier 7 and a moderate accumulation of drift was observed along the downstream half of the east face of Pier 6.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.